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Spontaneous Segregation of Self-Propelled Particles with Different Motilities[1] SAMUEL MCCANDLISH, APARNA BASKARAN, MICHAEL HAGAN, Brandeis University — We study mixtures of self-propelled and passive rod-like particles in two dimensions using Brownian dynamics simulations. The simulations demonstrate that the two species spontaneously segregate to generate a rich array of dynamical domain structures whose properties depend on the propulsion velocity, density, and composition. In addition to presenting phase diagrams as a function of the system parameters, we investigate the mechanisms driving segregation. We show that the difference in collision frequencies between self-propelled and passive rods provides a driving force for segregation, which is amplified by the tendency of the self-propelled rods to swarm or cluster. Finally, both self-propelled and passive rods exhibit giant number fluctuations for sufficient propulsion velocities.

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